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A PANEL

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(56) Prior Art Documents  
AU 29793/89 E04F 13/16 E04C 2/30 E04B 1/86  
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(57) Claim

1. A panel comprising:  
a tongue located on one edge of the panel; and  
a groove located in an opposite edge of the panel, the groove formed between a fastening portion and a retaining portion of the panel, the fastening portion protruding laterally extending beyond the retaining portion so that, in use, a pair of said panels can be joined by fixing one of said panels to a support member by passing a fastener through the fastening portion only of said one of said panels into said support member, and inserting the tongue of the other of said panels into the groove of said one of said panels so that the retaining portion of said one of said panels retains the tongue of said other of said panels and the fastener is substantially hidden by said tongue.

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**AUSTRALIA**

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**COMPLETE SPECIFICATION FOR A**

**STANDARD PATENT**

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Standard Complete Specification for the invention entitled:

**A PANEL**

Details of Associated Provisional Applications:

PN1417 dated 28 February 1995

The following is a full description of this invention, including the best method of performing it known to me:-

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A PANEL**FIELD OF THE INVENTION**

The present invention relates generally to a panel and a method for joining a plurality of panels and relates particularly, though not exclusively, to an improved tongue-and-groove joining system. Typically, the present invention relates to an improved tongue-and-groove joining system used, for example, in forming a ceiling.

**BACKGROUND TO THE INVENTION**

Various joining techniques are used for joining panels or boards together to form a ceiling, wall, or floor. A common joining system for joining floorboards transversely uses tongue-and-groove joints, each floorboard having a tongue and a groove located along opposite longitudinal edges, respectively. A tongue of one floorboard is inserted into a groove of an adjacent floorboard and a tongue-and-groove joint thus formed between adjacent floorboards. The floorboards are then secured by nailing or stapling to a floor joist. A suitable fastener, such as a nail, may either pass through a single floorboard into a floor joist, or through two adjacent floorboards at a tongue-and-groove joint into a floor joist.

When forming a floor, as described above, floorboards are joined longitudinally by butting adjacent transverse edges of each floorboard together and fixing each floorboard to a floor joist. The tongue-and-groove joints and/or the transverse edge joints of the floor may be glued to provide a stronger joint.

One drawback associated with the known tongue-and-groove joint is that the fastenings, such as the nails pass through an exposed surface of the floorboard. The nail is usually countersunk into the exposed surface of the floorboard and the void formed filled with putty or another

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suitable filter. Particularly with wooden floorboards which are to be coated with a transparent sealant, such as a polyurethane coating, the putty, even when it is matched to the wood, contrasts with the surrounding grain and colour of the floorboard. Even when floorboards are painted the putty or filler does not lie flush with the surrounding floorboard and, particularly with gloss paints, can be seen as a dimple on the exposed surface of the floorboard. This is aesthetically unpleasant and detracts from an otherwise attractive and well finished floor, wall, or ceiling.

When adjacent floorboards are fixed to a floor joist by nailing through the tongue-and-groove joint, the tongue can break away from the floorboard as adjacent floorboards expand and contract in a transverse direction. This expansion and contraction is largely caused by changes in atmospheric temperature and humidity.

#### SUMMARY OF THE INVENTION

An intention of the present invention is to provide a panel and a method for joining a plurality of panels which is relatively easy to assemble and, once assembled, is aesthetically pleasant.

According to a first aspect of the present invention there is provided a panel comprising:

- 25 a tongue located on one edge of the panel; and
- a groove located in an opposite edge of the panel, the groove formed between a fastening portion and a retaining portion of the panel, the fastening portion ~~protruding laterally~~ ~~extending~~ beyond the retaining portion so that, in use, a
- 30 pair of said panels can be joined by fixing one of said panels to a support member by passing a fastener through the fastening portion only of said one of said panels into said support member, and inserting the tongue of the other of said panels into the groove of said one of said panels



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so that the retaining portion of said one of said panels retains the tongue of said other of said panels and the fastener is substantially hidden by said tongue.

5 According to a second aspect of the present invention there is provided a joining system comprising:

a panel having a tongue located on one edge of the panel, and a groove located in an opposite edge of the panel, the groove formed between a fastening portion and a retaining portion of the panel, the fastening portion  
10 ~~extending~~ <sup>protruding laterally</sup> beyond the retaining portion; and

a fastener adapted to pass through the fastening portion only of said panel so that, in use, a pair of said panels can be joined by fixing one of said panels through the fastening portion only to a support member using said  
15 fastener and inserting the tongue of the other of said panels into the groove of said one of said panels so that the retaining portion of said one of said panels retains the tongue of said other of said panels and the fastener is substantially hidden by said tongue.

20 Typically, the tongue of the panel is of a complementary cross-sectional shape to the groove of said panel.

Preferably, the tongue of said other of said panels when inserted in the groove of said one of said panels is substantially free to slidably move relative to said one of  
25 said panels in a plane defined by said pair of panels.

In one embodiment the tongue and the groove of the panel are both substantially rectangular in cross-section.

Preferably, the panel comprises a first and a second rebate disposed adjacent opposite surfaces of the tongue, respectively, so that when the tongue is inserted into the groove of another panel the fastening portion of said  
30 another panel is at least partly received in the first



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rebate, and the retaining portion of said another panel is at least partly received in the second rebate.

5 In one form of the invention the first and the second rebates are shaped in cross-section complementary to the fastening portion and the retaining portion, respectively, so that when the tongue is inserted into the groove substantially all the first and second rebates are filled with the fastening and the retaining portions, respectively.

10 In one embodiment the first and second rebates, and the fastening and retaining portions are substantially rectangular in cross-section.

15 Typically, the panel is elongate, the tongue and groove of said elongate panel being located in opposing longitudinal edges of said panel, respectively, so that a plurality of elongate panels can be joined transversely.

20 Preferably, said elongate panel further comprises a transverse tongue and a transverse groove formed in opposite transverse edges, respectively, so that a pair of elongate panels can be joined longitudinally by inserting a transverse tongue of one of said elongate panels into a transverse groove of the other of said elongate panels to form a transverse tongue-and-groove joint.

25 Typically, the transverse tongue-and-groove joint on an exposed surface of said pair of elongate panels is substantially undetectable to the naked eye, adjacent edges of said pair of elongate panels butting together.

Typically, the fastener is a staple.

30 According to a third aspect of the present invention there is provided a method for joining a pair of panels, said

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method comprising the steps of:

fixing a fastening portion of one of said pair of panels to a support member using a fastener, said fastening portion disposed adjacent a groove located in one edge of said one of said panels, the groove located between the fastening portion and a retaining portion of said one of said panels, and the fastening portion <sup>protruding laterally</sup> ~~extending~~ beyond the retaining portion; and

inserting a tongue located on one edge of the other of said pair of panels into the groove of said one of said panels so that the retaining portion of said one of said panels retains the tongue of said other of said panels and the fastener is substantially hidden by the tongue when said pair of panels are joined.

Preferably, said method further comprises the step of longitudinally joining a pair of elongate panels each having a transverse tongue and a transverse groove formed in opposite transverse edges, respectively, by inserting the transverse tongue of one of said elongate panels into the transverse groove of the other of said panels to form a transverse tongue-and-groove joint.

#### BRIEF DESCRIPTION OF DRAWINGS

In order to achieve a better understanding of the nature of the present invention a preferred embodiment of a panel and a method for joining a plurality of panels according to the present invention will now be described in some detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a plurality of panels of indefinite length resting on a pair of support members, the panels about to be joined and anchored to the support members;

Figure 2 is a perspective view of one of the panels of indefinite length shown in figure 1; and



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Figure 3 is an end view of the first and second panels shown in figure 1 joined to form an improved tongue-and-groove joint.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

5 As shown in Figure 1 there is provided a first panel 10A, a second panel 10B, and a third panel 10C to be joined and anchored to a pair of support members, in this example ceiling joists 16A, 16B. In this example, each of the panels 10 is elongate and is constructed of a medium density fibreboard (MDF) coated in a synthetic veneer.

10 As best shown in figure 2, each panel 10 has a tongue 18 and a groove 20 located on opposing longitudinal edges, respectively. Each panel 10 also has a transverse tongue 46 and a transverse groove 48 formed in opposite transverse edges, respectively.

15 As shown in Figure 3, each panel 10A, 10B has a retaining portion 26A, 26B disposed adjacent the groove 20A, 20B and a fastening portion 32A, 32B disposed opposite the retaining portion 26A, 26B. The fastening portion 32A, 32B <sup>protrudes laterally</sup> extends beyond the retaining portion 26A, 26B and is designed to receive a fastener, such as a staple 38, therethrough for fixing the respective panel 10 to each of the ceiling joist 16A, 16B (see figure 1).

20 As illustrated in figure 1, the tongue 18A of the first panel 10A when inserted into the groove 20B of the second panel 10B covers the staple 38. An improved tongue-and-groove joint shown generally as 24 is thus formed. The retaining portion 26B (depicted in figure 3) of the second panel 10B retains the tongue 18A of the first panel 10A.

25 Furthermore, the tongue 18A hides the staple 38 which fixes the first panel 10A to the ceiling joist 16A.

30 In this example, each of the tongues 18 is substantially





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rectangular in cross-section, and is of a complementary shape to each of the grooves 20. The tongue 18 of each panel 10 is substantially free to slidably move relative to the groove 20 of an adjacent panel 10. Expansion and contraction of each panel 10, caused by changes in atmospheric temperature and humidity, can thus occur without stressing the improved tongue-and-groove joints 24.

As depicted in figure 2, each of the panels 10 has a first and a second rebate 40, 42 disposed adjacent opposite surfaces, respectively, of the tongue 18. The first rebate 40 is wider than the second rebate 42, and also wider than the retaining portion 26B of the second panel 10B. When the first and second panels 10A, 10B are joined a recess 44 (see figure 3) is thus formed between said panels 10A, 10B. In this example of the invention the recess 44 is designed for aesthetic reasons.

The panels 10 can also be joined longitudinally by inserting the transverse tongue 46C of the third panel 10C into the transverse groove 48B of the second panel 10B to form a transverse tongue-and-groove joint shown generally as 50 in figure 1. The transverse tongue-and-groove joint 50 of this embodiment cannot be easily detected by the naked eye, adjacent edges of the second and third panels 10B, 10C butting together.

To further achieve a better understanding of the nature of the present invention assembly of the above described panels 10 will now be explained in some detail. In this case the panels 10 will be used to form a ceiling.

As illustrated in figure 1 the second panel 10B is fixed to the ceiling joist 16A by stapling through the fastening portion 32B of the second panel 10B. The third panel 10C is then joined to the second panel 10B by inserting the transverse tongue 46C of the third panel 10C into the

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transverse groove 48B of the second panel 10B to form the transverse tongue-and-groove joint 50. Additional panels 10 are then connected longitudinally to the third panel 10C until a final panel (not shown) must then be cut to the  
5 required length depending on the width or length of the room in which the ceiling is formed.

A transverse tongue 46 or transverse groove 48 of the cut portion of the final panel is then inserted into a transverse groove 48 or a transverse tongue 46,  
10 respectively, of a starting panel located at an opposite side of the room (not shown). In the example illustrated (see figure 1) once the fastening portion 32B of the second panel 10B is stapled to the ceiling joist 16A the tongue 18A of first panel 10A can be inserted into the groove 20B  
15 of the second panel 10B to form the improved tongue-and-groove joint 24. Further transverse tongue-and-groove joints 50 are then formed so that the panels 10 extend longitudinally across the room. The fastening portion 32 of each panel 10 is, in this example, stapled to a ceiling  
20 joist 16. Because the cut portion of each panel 10 forms the starter panel at an opposite side of the room there is relatively little waste when a ceiling is formed.

Once the ceiling has been formed as described above the fasteners, in this example staples, used to anchor each  
25 panel to the ceiling joists 16 are substantially hidden. Furthermore, the transverse tongue-and-groove joints 50 are substantially undetectable to the naked eye and, therefore, the overall appearance of the ceiling is aesthetically pleasant.

30 Now that a preferred embodiment of a joining system according to the present invention has been described it will be apparent to persons skilled in the relevant arts that the joining system has at least the following advantages over the admitted prior art:

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1. the joining system is aesthetically pleasant, fasteners used to anchor the panels to the support members being substantially hidden;
2. the joining system is relatively easy to assemble; and
3. the joining system provides an improved tongue-and-groove joint between adjacent panels which allows for movement between adjacent panels during expansion and contraction of said panels.

10 It will be apparent to persons skilled in the relevant arts that numerous variations and modifications can be made to the joining system described without departing from the basic inventive concept of the present invention. For example, the elongate panels described herein may in fact  
15 be of any shape having a tongue and a groove according to the present invention located on adjacent edges thereof. The tongue and groove profile described herein may take practically any cross-sectional shape so long as one panel has a fastening portion disposed adjacent a groove, the  
20 fastening portion extending beyond a retaining portion of the panel disposed opposite the fastening portion, as defined herein. The panels to be joined may be constructed of any material and are not limited to the coated MDF material described. All such variations and modifications  
25 are to be considered within the scope of the present invention the nature of which is to be determined from the foregoing description.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A panel comprising:  
 a tongue located on one edge of the panel; and  
 a groove located in an opposite edge of the  
 5 panel, the groove formed between a fastening portion and a  
 retaining portion of the panel, the fastening portion  
~~extending~~ <sup>protruding laterally</sup> beyond the retaining portion so that, in use, a  
 pair of said panels can be joined by fixing one of said  
 panels to a support member by passing a fastener through  
 10 the fastening portion only of said one of said panels into  
 said support member, and inserting the tongue of the other  
 of said panels into the groove of said one of said panels  
 so that the retaining portion of said one of said panels  
 retains the tongue of said other of said panels and the  
 15 fastener is substantially hidden by said tongue.

2. A joining system comprising:  
 a panel having a tongue located on one edge of  
 the panel, and a groove located in an opposite edge of the  
 panel, the groove formed between a fastening portion and a  
 20 retaining portion of the panel, the fastening portion  
~~extending~~ <sup>protruding laterally</sup> beyond the retaining portion; and  
 a fastener adapted to pass through the fastening  
 portion only of said panel so that, in use, a pair of said  
 panels can be joined by fixing one of said panels through  
 25 the fastening portion only to a support member using said  
 fastener and inserting the tongue of the other of said  
 panels into the groove of said one of said panels so that  
 the retaining portion of said one of said panels retains  
 the tongue of said other of said panels and the fastener is  
 30 substantially hidden by said tongue.

3. A panel or a joining system as defined in either  
 claim 1 or 2 wherein the tongue of the panel is of a  
 complementary cross-sectional shape to the groove of said  
 panel.



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4. A panel or a joining system as defined in any one of the preceding claims wherein the tongue of said other of said panels when inserted in the groove of said one of said panels is substantially free to slidably move relative to  
5 said one of said panels in a plane defined by said pair of panels.

5. A panel or a joining system as defined in any one of the preceding claims wherein the tongue and the groove of the panel are both substantially rectangular in cross-  
10 section.

6. A panel or a joining system as defined in any one of the preceding claims wherein the panel comprises a first and a second rebate disposed adjacent opposite surfaces of the tongue, respectively, so that when the tongue is  
15 inserted into the groove of another panel the fastening portion of said another panel is at least partly received in the first rebate, and the retaining portion of said another panel is at least partly received in the second rebate.

7. A panel or a joining system as defined in claim 6 wherein the first and the second rebates are shaped in cross-section complementary to the fastening portion and the retaining portion, respectively, so that when the tongue is inserted into the groove substantially all the  
20 first and second rebates are filled with the fastening and the retaining portions, respectively.  
25

8. A panel or a joining system as defined in either claim 6 or 7 wherein the first and second rebates, and the fastening and retaining portions are substantially  
30 rectangular in cross-section.

9. A panel or a joining system as defined in any one of the preceding claims wherein the panel is elongate, the

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tongue and groove of said elongate panel being located in opposing longitudinal edges of said panel, respectively, so that a plurality of elongate panels can be joined transversely.

5 10. A panel or a joining system as defined in claim 9 wherein said elongate panel further comprises a transverse tongue and a transverse groove formed in opposite transverse edges, respectively, so that a pair of elongate panels can be joined longitudinally by inserting a  
10 transverse tongue of one of said elongate panels into a transverse groove of the other of said elongate panels to form a transverse tongue-and-groove joint.

11. A panel or a joining system as defined in claim 10 wherein the transverse tongue-and-groove joint on an  
15 exposed surface of said pair of elongate panels is substantially undetectable to the naked eye, adjacent edges of said pair of elongate panels butting together.

12. A panel or a joining system as defined in any one of the preceding claims wherein the fastener is a staple.

20 13. A method for joining a pair of panels, said method comprising the steps of:

fixing a fastening portion of one of said pair of panels to a support member using a fastener, said fastening portion disposed adjacent a groove located in one edge of  
25 said one of said panels, the groove located between the fastening portion and a retaining portion of said one of said panels, and the fastening portion <sup>protruding laterally</sup> extending beyond the retaining portion; and

30 inserting a tongue located on one edge of the other of said pair of panels into the groove of said one of said panels so that the retaining portion of said one of said panels retains the tongue of said other of said panels and the fastener is substantially hidden by the tongue when



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said pair of panels are joined.

14. A method for joining a pair of panels as defined in claim 13 further comprising the step of longitudinally joining a pair of elongate panels each having a transverse tongue and a transverse groove formed in opposite transverse edges, respectively, by inserting the transverse tongue of one of said elongate panels into the transverse groove of the other of said panels to form a transverse tongue-and-groove joint.

10 15. A panel or a joining system substantially as herein described with reference to and as illustrated in the accompanying drawings.

16. A method for joining a pair of panels substantially as herein described with reference to and as illustrated in the accompanying drawings.

DATED THIS 11TH DAY OF OCTOBER, 1995

GUENTER CRISKAMP

By His Patent Attorneys:  
GRIFFITH HACK & CO.

20 Fellows Institute of Patent Attorneys of Australia.

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**ABSTRACT**

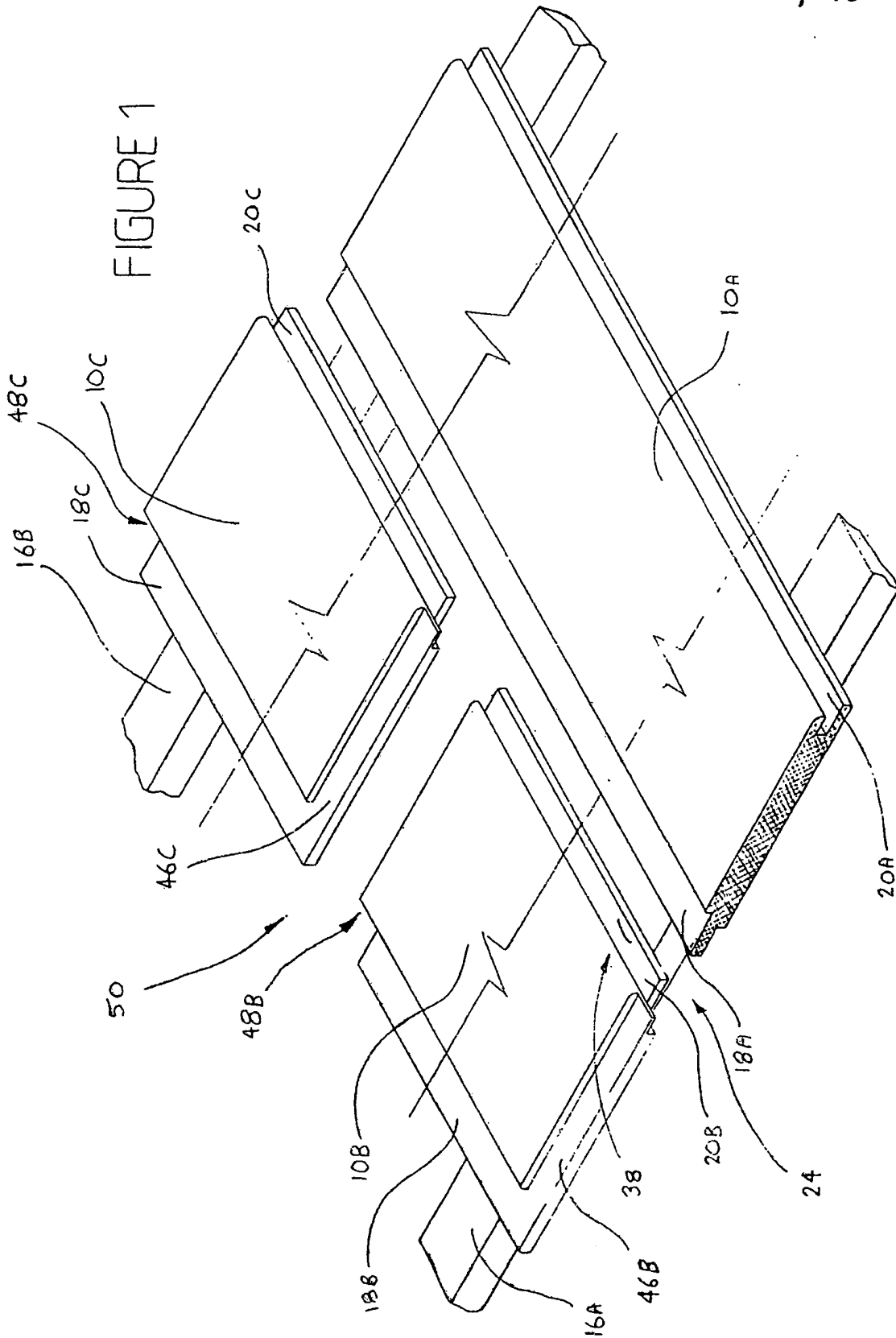
The present invention relates to a panel (10) and a method for joining a plurality of panels (10A, 10B, 10C). Each panel (10) has a tongue (18) and a groove (20) located on  
5 opposing longitudinal edges, respectively. Each panel (10) also has a retaining portion (26) disposed adjacent the groove (20) and a fastening portion (32) disposed opposite the retaining portion (26). The fastening portion (32)  
10 extends beyond the retaining portion (26) and is designed to receive a fastener, such as a staple (38), therethrough for fixing the respective panel (10) to each of a pair of support members, in this example sealing joists (16A, 16B). The tongue (18) of one panel (10A) when inserted into the  
15 groove (20) of another panel (10B) covers the staple (38). Furthermore, the tongue (18) of each panel (10) is substantially free to slidably move relative to the groove (20) of an adjacent panel (10).



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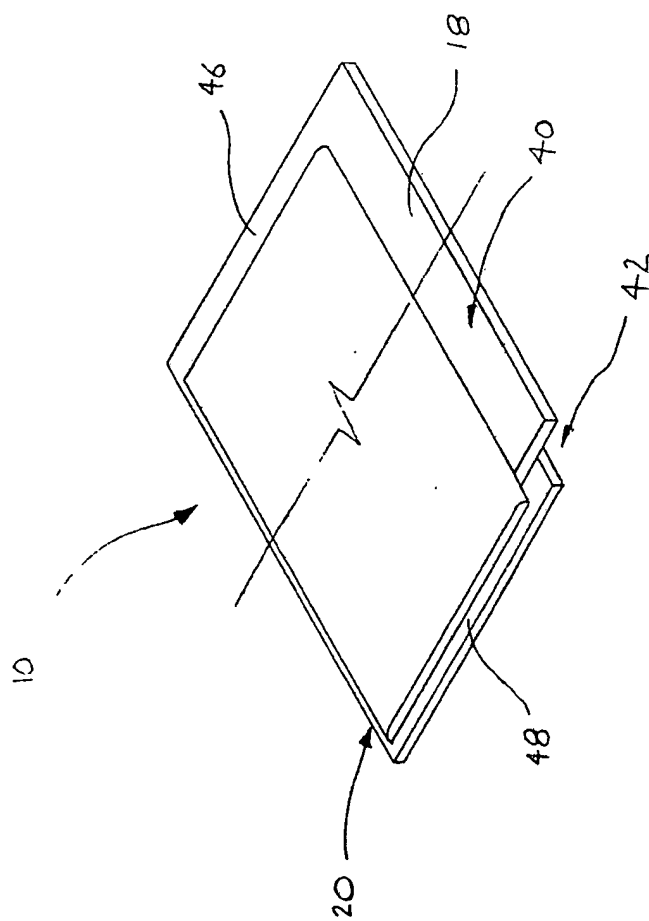
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FIGURE 1



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FIGURE 2



11 10 35 304

FIGURE 3

